

WO 2004/030636

1/35

SEQUENCE LISTING

<110> Wyeth
Cassetti, Maria C.
Smith, Larry

<120> HUMAN PAPILLOMAVIRUS POLYPEPTIDES AND IMMUNOGENIC COMPOSITIONS

<130> 00630/200M137-WOO

<150> US 60/415,929

<151> 2002-10-03

<160> 65

<170> PatentIn version 3.1

<210> 1

<211> 248

<212> PRT

<213> Human papillomavirus type 16

<400> 1

Met Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu Cys
1 5 10 15

Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val Tyr
20 25 30

Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe Arg
35 40 45

Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Cys Asp
50 55 60

Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr Cys
65 70 75 80

Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro Leu
85 90 95

Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys Pro Leu Cys Pro
100 105 110

Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn Ile
115 120 125

Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser Arg
130 135 140

Thr Arg Arg Glu Thr Gln Leu His Gly Asp Thr Pro Thr Leu His Glu
145 150 155 160

Tyr Met Leu Asp Leu Gln Pro Glu Thr Thr Asp Leu Tyr Cys Tyr Glu
165 170 175

WO 2004/030636

2/35

Gln Leu Asn Asp Ser Ser Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala
 180 185 190

Gly Gln Ala Glu Pro Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys
 195 200 205

Cys Lys Cys Asp Ser Thr Leu Arg Leu Cys Val Gln Ser Thr His Val
 210 215 220

Asp Ile Arg Thr Leu Glu Asp Leu Leu Met Gly Thr Leu Gly Ile Val
 225 230 235 240

Cys Pro Ile Cys Ser Gln Lys Pro
 245

<210> 2
 <211> 747
 <212> DNA
 <213> Human papillomavirus type 16

<400> 2
 atgtttcagg acccacagga gcgacccaga aagttaccac agttatgcac agagctgcaa 60
 acaactatac atgatataat attagaatgt gtgtactgca agcaacagtt actgcgacgt 120
 gaggtatatg actttgcttt tcgggattta tgcatagtat atagagatgg gaatccatat 180
 gctgtatgtg ataaatgttt aaagttttat tctaaaatta gtgagtatag acattattgt 240
 tatagtgtgt atggaacaac attagaacag caatacaaca aaccgttggtg tgatttgta 300
 attaggtgta ttaactgtca aaagccactg tgcctgaag aaaagcaaag acatctggac 360
 aaaaagcaaa gattccataa tataaggggt cggtaggaccg gtcgatgtat gtcttggtgc 420
 agatcatcaa gaacacgtag agaaaccag ctgcatggag atacacctac attgcatgaa 480
 tatatgtagg atttgaacc agagacaact gatctctact gttatgagca attaaatgac 540
 agctcagagg aggaggatga aatagatggt ccagctggac aagcagaacc ggacagagcc 600
 cattacaata ttgtaacctt ttgttgcaag tgtgactcta cgcttcggtt gtgcgtacaa 660
 agcacacacg tagacattcg tactttggaa gacctgttaa tgggcacact aggaattgtg 720
 tgcccatct gttctcagaa accataa 747

<210> 3
 <211> 248
 <212> PRT
 <213> Human papillomavirus type 16

<400> 3
 Met Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu Cys
 1 5 10 15

WO 2004/030636

3/35

Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val Tyr
 20 25 30

Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe Arg
 35 40 45

Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Gly Asp
 50 55 60

Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr Cys
 65 70 75 80

Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro Leu
 85 90 95

Cys Asp Leu Leu Ile Arg Cys Ile Asn Gly Gln Lys Pro Leu Cys Pro
 100 105 110

Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn Ile
 115 120 125

Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser Arg
 130 135 140

Thr Arg Arg Glu Thr Gln Leu His Gly Asp Thr Pro Thr Leu His Glu
 145 150 155 160

Tyr Met Leu Asp Leu Gln Pro Glu Thr Thr Asp Leu Tyr Gly Tyr Gly
 165 170 175

Gln Leu Asn Asp Ser Ser Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala
 180 185 190

Gly Gln Ala Glu Pro Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys
 195 200 205

Cys Lys Cys Asp Ser Thr Leu Arg Leu Cys Val Gln Ser Thr His Val
 210 215 220

Asp Ile Arg Thr Leu Glu Asp Leu Leu Met Gly Thr Leu Gly Ile Val
 225 230 235 240

Cys Pro Ile Cys Ser Gln Lys Pro
 245

<210> 4
 <211> 747
 <212> DNA
 <213> Human papillomavirus type 16
 <400> 4

WO 2004/030636

4/35

atgttttcagg acccacagga gcgacccaga aagttaccac agttatgcac agagctgcaa 60
 acaactatac atgatataat attagaatgt gtgtactgca agcaacagtt actgcgacgt 120
 gaggtatatg actttgcttt tcgggattta tgcatagtat atagagatgg gaatccatat 180
 gctgtagggtg ataaatgttt aaagttttat tctaaaatta gtgagtatag acattattgt 240
 tatagtgtgt atggaacaac attagaacag caatacaaca aaccgttgtg tgatttgta 300
 attagtgta ttaacgggtca aaagccactg tgcctgaag aaaagcaaag acatctggac 360
 aaaaagcaaa gattccataa tataaggggt cgggtggaccg gtcgatgtat gtcttggtgc 420
 agatcatcaa gaacacgtag agaaccacag ctgcatggag atacacctac attgcatgaa 480
 tatatgtag atttgcaacc agagacaact gatctctacg gttatgggca attaaatgac 540
 agctcagagg aggaggatga aatagatggt ccagctggac aagcagaacc ggacagagcc 600
 cattacaata ttgtaacctt ttgttgcaag tgtgactcta cgcttcggtt gtgcgtacaa 660
 agcacacacg tagacattcg tactttggaa gacctgttaa tgggcacact aggaattgtg 720
 tgcccatct gttctcagaa accataa 747

<210> 5
 <211> 248
 <212> PRT
 <213> Human papillomavirus type 16

<400> 5

Met Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu Cys
 1 5 10 15

Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val Tyr
 20 25 30

Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe Arg
 35 40 45

Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Gly Asp
 50 55 60

Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr Cys
 65 70 75 80

Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro Leu
 85 90 95

Cys Asp Leu Leu Ile Arg Cys Ile Asn Gly Gln Lys Pro Leu Cys Pro
 100 105 110

Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn Ile
 115 120 125

WO 2004/030636

5/35

Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser Arg
 130 135 140

Thr Arg Arg Glu Thr Gln Leu His Gly Asp Thr Pro Thr Leu His Glu
 145 150 155 160

Tyr Met Leu Asp Leu Gln Pro Glu Thr Thr Asp Leu Tyr Gly Tyr Gly
 165 170 175

Gln Leu Asn Asp Ser Ser Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala
 180 185 190

Gly Gln Ala Glu Pro Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys
 195 200 205

Cys Lys Cys Asp Ser Thr Leu Arg Leu Cys Val Gln Ser Thr His Val
 210 215 220

Asp Ile Arg Thr Leu Glu Asp Leu Leu Met Gly Thr Leu Gly Ile Val
 225 230 235 240

Gly Pro Ile Cys Ser Gln Lys Pro
 245

<210> 6
 <211> 747
 <212> DNA
 <213> Human papillomavirus type 16

<400> 6
 atgtttcagg acccacagga gcgaccaga aagttaccac agttatgcac agagctgcaa 60
 acaactatac atgatataat attagaatgt gtgtactgca agcaacagtt actgcgacgt 120
 gaggtatatg actttgcttt tcgggattta tgcatagtat atagagatgg gaatccatat 180
 gctgtaggtg ataaatgttt aaagttttat tctaaaatta gtgagtatag acattattgt 240
 tatagtgtgt atggaacaac attagaacag caatacaaca aaccgttggt tgatttggtta 300
 attaggtgta ttaacggtca aaagccactg tgcctgaag aaaagcaaag acatctggac 360
 aaaaagcaaa gattccataa tataaggggt cggtaggaccg gtcgatgtat gtcttggtgc 420
 agatcatcaa gaacacgtag agaaaccag ctgcatggag atacacctac attgcatgaa 480
 tatatgtag atttgcaacc agagacaact gatctctacg gttatgggca attaatgac 540
 agctcagagg aggaggatga aatagatggt ccagctggac aagcagaacc ggacagagcc 600
 cattacaata ttgtaacctt ttgttgcaag tgtgactcta cgcttcggtt gtgcgtacaa 660
 agcacacacg tagacattcg tactttggaa gacctgttaa tgggcacact aggaattgtg 720
 ggccccatct gttctcagaa accataa 747

<210> 7

WO 2004/030636

6/35

<211> 248
 <212> PRT
 <213> Human papillomavirus type 16

<400> 7

Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu Gln
 1 5 10 15

Pro Glu Thr Thr Asp Leu Tyr Cys Tyr Glu Gln Leu Asn Asp Ser Ser
 20 25 30

Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro Asp
 35 40 45

Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser Thr
 50 55 60

Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu Glu
 65 70 75 80

Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro Ile Cys Ser Gln
 85 90 95

Lys Pro Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu
 100 105 110

Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val
 115 120 125

Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe
 130 135 140

Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Cys
 145 150 155 160

Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr
 165 170 175

Cys Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro
 180 185 190

Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys Pro Leu Cys
 195 200 205

Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn
 210 215 220

Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser
 225 230 235 240

WO 2004/030636

7/35

Arg Thr Arg Arg Glu Thr Gln Leu
245

<210> 8
<211> 747
<212> DNA
<213> Human papillomavirus type 16

<400> 8
atgcatggag atacacctac attgcatgaa tatatgtag atttgaacc agagacaact 60
gatctctact gttatgagca attaaatgac agctcagagg aggaggatga aatagatggg 120
ccagctggac aagcagaacc ggacagagcc cattacaata ttgtaacctt ttgttgcaag 180
tgtgactcta cgcttcgggt gtgcgtacaa agcacacacg tagacattcg tactttggaa 240
gacctgttaa tgggcacact aggaattgtg tgccccatct gttctcagaa accatttcag 300
gaccacagg agcgacccag aaagttacca cagttagtga cagagctgca aacaactata 360
catgatataa tattagaatg tgtgtactgc aagcaacagt tactgagcag tgaggtatat 420
gactttgctt ttcgggattt atgcatagta tatagagatg ggaatccata tgctgtatgt 480
gataaatggt taaagtttta ttctaaaatt agtgagtata gacattattg ttatagtgtg 540
tatggaacaa cattagaaca gcaatacaac aaaccgttgt gtgatttgtt aattaggtgt 600
attaactgtc aaaagccact gtgtcctgaa gaaaagcaaa gacatctgga caaaaagcaa 660
agattccata atataagggg tcggtggacc ggtcgatgta tgtcttggtg cagatcatca 720
agaacacgta gagaaaccca gctgtaa 747

<210> 9
<211> 248
<212> PRT
<213> Human papillomavirus type 16

<400> 9

Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu Gln
1 5 10 15

Pro Glu Thr Thr Asp Leu Tyr Gly Tyr Gly Gln Leu Asn Asp Ser Ser
20 25 30

Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro Asp
35 40 45

Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser Thr
50 55 60

Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu Glu
65 70 75 80

Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro Ile Cys Ser Gln
85 90 95

Lys Pro Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu
100 105 110

Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val
115 120 125

Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe
130 135 140

Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Gly
145 150 155 160

Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr
165 170 175

Cys Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro
180 185 190

Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Gly Gln Lys Pro Leu Cys
195 200 205

Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn
210 215 220

Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser
225 230 235 240

Arg Thr Arg Arg Glu Thr Gln Leu
245

<210> 10

<211> 747

<212> DNA

<213> Human papillomavirus type 16

<400> 10
atgcatggag atacacctac attgcatgaa tatatgttag atttgcaacc agagacaact 60
gatctctacg gttatgggca attaaatgac agctcagagg aggaggatga aatagatggt 120
ccagctggac aagcagaacc ggacagagcc cattacaata ttgtaacctt ttgttgcaag 180
tgtgactcta cgcttcgggt gtgcgtacaa agcacacacg tagacattcg tactttggaa 240
gacctgttaa tgggcacact aggaattgtg tgcccatct gttctcagaa accatttcag 300
gaccacagg agcgaccag aaagttacca cagttatgca cagagctgca aacaactata 360
catgatataa tattagaatg tgtgtactgc aagcaacagt tactgcgacg tgaggatatat 420
gactttgctt ttcggtattt atgcatagta tatagagatg ggaatccata tgctgtaggt 480
gataaatggt taaagtttta ttctaaaatt agtgagtata gacattattg ttatagtgtg 540

tatggaacaa cattagaaca gcaatacaac aaaccgttgt gtgatttggt aattaggtgt 600
 attaacggtc aaaagccact gtgtcctgaa gaaaagcaaa gacatctgga caaaaagcaa 660
 agattccata atataagggg tcgggtggacc ggctgatgta tgtcttggtg cagatcatca 720
 agaacacgta gagaaaccca gctgtaa 747

<210> 11
 <211> 248
 <212> PRT
 <213> Human papillomavirus type 16

<400> 11

Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu Gln
 1 5 10 15

Pro Glu Thr Thr Asp Leu Tyr Gly Tyr Gly Gln Leu Asn Asp Ser Ser
 20 25 30

Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro Asp
 35 40 45

Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser Thr
 50 55 60

Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu Glu
 65 70 75 80

Asp Leu Leu Met Gly Thr Leu Gly Ile Val Gly Pro Ile Cys Ser Gln
 85 90 95

Lys Pro Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu
 100 105 110

Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val
 115 120 125

Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe
 130 135 140

Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Gly
 145 150 155 160

Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr
 165 170 175

Cys Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro
 180 185 190

Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Gly Gln Lys Pro Leu Cys
 195 200 205

WO 2004/030636

10/35

Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn
 210 215 220

Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser
 225 230 235 240

Arg Thr Arg Arg Glu Thr Gln Leu
 245

<210> 12
 <211> 747
 <212> DNA
 <213> Human papillomavirus type 16

<400> 12
 atgcatggag atacacctac attgcatgaa tatatgtag atttgcaacc agagacaact 60
 gatctctacg gttatgggca attaaatgac agctcagagg aggaggatga aatagatggg 120
 ccagctggac aagcagaacc ggacagagcc cattacaata ttgtaacctt ttgttgcaag 180
 tgtgactcta cgcttcgggt gtgctgacaa agcacacacg tagacattcg tactttggaa 240
 gacctgttaa tgggcacact aggaattgtg ggccccatct gttctcagaa accatttcag 300
 gaccacagc agcgacccag aaagttacca cagttatgca cagagctgca aacaactata 360
 catgatataa tattagaatg tgtgtactgc aagcaacagt tactgcgacg tgaggtatat 420
 gactttgctt ttcgggattt atgcatagta tatagagatg ggaatccata tgctgtaggt 480
 gataaatggt taaagtttta ttctaaaatt agtgagtata gacattattg ttatagtgtg 540
 tatggaacaa cattagaaca gcaatacaac aaaccgttgt gtgatttggt aattaggtgt 600
 attaacggtc aaaagccact gtgtcctgaa gaaaagcaaa gacatctgga caaaaagcaa 660
 agattccata atataagggg tcggtggacc ggtcgtatgta tgtcttgttg cagatcatca 720
 agaacacgta gagaaaccca gctgtaa 747

<210> 13
 <211> 151
 <212> PRT
 <213> Human papillomavirus type 16

<400> 13

Met Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu Cys
 1 5 10 15

Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val Tyr
 20 25 30

Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe Arg
 35 40 45

11/35

Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Cys Asp
 50 55 60

Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr Cys
 65 70 75 80

Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro Leu
 85 90 95

Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys Pro Leu Cys Pro
 100 105 110

Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn Ile
 115 120 125

Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser Arg
 130 135 140

Thr Arg Arg Glu Thr Gln Leu
 145 150

<210> 14
 <211> 98
 <212> PRT
 <213> Human papillomavirus type 16

<400> 14

Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu Gln
 1 5 10 15

Pro Glu Thr Thr Asp Leu Tyr Cys Tyr Glu Gln Leu Asn Asp Ser Ser
 20 25 30

Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro Asp
 35 40 45

Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser Thr
 50 55 60

Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu Glu
 65 70 75 80

Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro Ile Cys Ser Gln
 85 90 95

Lys Pro

<210> 15
 <211> 158
 <212> PRT

<213> Human papillomavirus type 18

<400> 15

Met Ala Arg Phe Glu Asp Pro Thr Arg Arg Pro Tyr Lys Leu Pro Asp
1 5 10 15

Leu Cys Thr Glu Leu Asn Thr Ser Leu Gln Asp Ile Glu Ile Thr Cys
20 25 30

Val Tyr Cys Lys Thr Val Leu Glu Leu Thr Glu Val Phe Glu Phe Ala
35 40 45

Phe Lys Asp Leu Phe Val Val Tyr Arg Asp Ser Ile Pro His Ala Ala
50 55 60

Cys His Lys Cys Ile Asp Phe Tyr Ser Arg Ile Arg Glu Leu Arg His
65 70 75 80

Tyr Ser Asp Ser Val Tyr Gly Asp Thr Leu Glu Lys Leu Thr Asn Thr
85 90 95

Gly Leu Tyr Asn Leu Leu Ile Arg Cys Leu Arg Cys Gln Lys Pro Leu
100 105 110

Asn Pro Ala Glu Lys Leu Arg His Leu Asn Glu Lys Arg Arg Phe His
115 120 125

Asn Ile Ala Gly His Tyr Arg Gly Gln Cys His Ser Cys Cys Asn Arg
130 135 140

Ala Arg Gln Glu Arg Leu Gln Arg Arg Arg Glu Thr Gln Val
145 150 155

<210> 16

<211> 149

<212> PRT

<213> Human papillomavirus type 31

<400> 16

Met Phe Lys Asn Pro Ala Glu Arg Pro Arg Lys Leu His Glu Leu Ser
1 5 10 15

Ser Ala Leu Glu Ile Pro Tyr Asp Glu Leu Arg Leu Asn Cys Val Tyr
20 25 30

Cys Lys Gly Gln Leu Thr Glu Thr Glu Val Leu Asp Phe Ala Phe Thr
35 40 45

Asp Leu Thr Ile Val Tyr Arg Asp Asp Thr Pro His Gly Val Cys Thr
50 55 60

Lys Cys Leu Arg Phe Tyr Ser Lys Val Ser Glu Phe Arg Trp Tyr Arg
65 70 75 80

Tyr Ser Val Tyr Gly Thr Thr Leu Glu Lys Leu Thr Asn Lys Gly Ile
85 90 95

Cys Asp Leu Leu Ile Arg Cys Ile Thr Cys Gln Arg Pro Leu Cys Pro
100 105 110

Glu Glu Lys Gln Arg His Leu Asp Lys Lys Lys Arg Phe His Asn Ile
115 120 125

Gly Gly Arg Trp Thr Gly Arg Cys Ile Ala Cys Trp Arg Arg Pro Arg
130 135 140

Thr Glu Thr Gln Val
145

<210> 17
<211> 149
<212> PRT
<213> Human papillomavirus type 33

<400> 17

Met Phe Gln Asp Thr Glu Glu Lys Pro Arg Thr Leu His Asp Leu Cys
1 5 10 15

Gln Ala Leu Glu Thr Thr Ile His Asn Ile Glu Leu Gln Cys Val Glu
20 25 30

Cys Lys Lys Pro Leu Gln Arg Ser Glu Val Tyr Asp Phe Ala Phe Ala
35 40 45

Asp Leu Thr Val Val Tyr Arg Glu Gly Asn Pro Phe Gly Ile Cys Lys
50 55 60

Leu Cys Leu Arg Phe Leu Ser Lys Ile Ser Glu Tyr Arg His Tyr Asn
65 70 75 80

Tyr Ser Val Tyr Gly Asn Thr Leu Glu Gln Thr Val Lys Lys Pro Leu
85 90 95

Asn Glu Ile Leu Ile Arg Cys Ile Ile Cys Gln Arg Pro Leu Cys Pro
100 105 110

Gln Glu Lys Lys Arg His Val Asp Leu Asn Lys Arg Phe His Asn Ile
115 120 125

Ser Gly Arg Trp Ala Gly Arg Cys Ala Ala Cys Trp Arg Ser Arg Arg
130 135 140

Arg Glu Thr Ala Leu
145

<210> 18
<211> 149
<212> PRT
<213> Human papillomavirus type 35

<400> 18

Met Phe Gln Asp Pro Ala Glu Arg Pro Tyr Lys Leu His Asp Leu Cys
1 5 10 15

Asn Glu Val Glu Glu Ser Ile His Glu Ile Cys Leu Asn Cys Val Tyr
20 25 30

Cys Lys Gln Glu Leu Gln Arg Ser Glu Val Tyr Asp Phe Ala Cys Tyr
35 40 45

Asp Leu Cys Ile Val Tyr Arg Glu Gly Gln Pro Tyr Gly Val Cys Met
50 55 60

Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg Trp Tyr Arg
65 70 75 80

Tyr Ser Val Tyr Gly Glu Thr Leu Glu Lys Gln Cys Asn Lys Gln Leu
85 90 95

Cys His Leu Leu Ile Arg Cys Ile Thr Cys Gln Lys Pro Leu Cys Pro
100 105 110

Val Glu Lys Gln Arg His Leu Glu Glu Lys Lys Arg Phe His Asn Ile
115 120 125

Gly Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Trp Lys Pro Thr Arg
130 135 140

Arg Glu Thr Glu Val
145

<210> 19
<211> 158
<212> PRT
<213> Human papillomavirus type 39

<400> 19

Met Ala Arg Phe His Asn Pro Ala Glu Arg Pro Tyr Lys Leu Pro Asp
1 5 10 15

Leu Cys Thr Thr Leu Asp Thr Thr Leu Gln Asp Ile Thr Ile Ala Cys
20 25 30

Val Tyr Cys Arg Arg Pro Leu Gln Gln Thr Glu Val Tyr Glu Phe Ala
 35 40 45

Phe Ser Asp Leu Tyr Val Val Tyr Arg Asp Gly Glu Pro Leu Ala Ala
 50 55 60

Cys Gln Ser Cys Ile Lys Phe Tyr Ala Lys Ile Arg Glu Leu Arg Tyr
 65 70 75 80

Tyr Ser Asp Ser Val Tyr Ala Thr Thr Leu Glu Asn Ile Thr Asn Thr
 85 90 95

Lys Leu Tyr Asn Leu Leu Ile Arg Cys Met Cys Cys Leu Lys Pro Leu
 100 105 110

Cys Pro Ala Glu Lys Leu Arg His Leu Asn Ser Lys Arg Arg Phe His
 115 120 125

Lys Ile Ala Gly Ser Tyr Thr Gly Gln Cys Arg Arg Cys Trp Thr Thr
 130 135 140

Lys Arg Glu Asp Arg Arg Leu Thr Arg Arg Glu Thr Gln Val
 145 150 155

<210> 20
 <211> 158
 <212> PRT
 <213> Human papillomavirus type 45

<400> 20

Met Ala Arg Phe Asp Asp Pro Lys Gln Arg Pro Tyr Lys Leu Pro Asp
 1 5 10 15

Leu Cys Thr Glu Leu Asn Thr Ser Leu Gln Asp Val Ser Ile Ala Cys
 20 25 30

Val Tyr Cys Lys Ala Thr Leu Glu Arg Thr Glu Val Tyr Gln Phe Ala
 35 40 45

Phe Lys Asp Leu Cys Ile Val Tyr Arg Asp Cys Ile Ala Tyr Ala Ala
 50 55 60

Cys His Lys Cys Ile Asp Phe Tyr Ser Arg Ile Arg Glu Leu Arg Tyr
 65 70 75 80

Tyr Ser Asn Ser Val Tyr Gly Glu Thr Leu Glu Lys Ile Thr Asn Thr
 85 90 95

Glu Leu Tyr Asn Leu Leu Ile Arg Cys Leu Arg Cys Gln Lys Pro Leu

100 105 110
 Asn Pro Ala Glu Lys Arg Arg His Leu Lys Asp Lys Arg Arg Phe His
 115 120 125
 Ser Ile Ala Gly Gln Tyr Arg Gly Gln Cys Asn Thr Cys Cys Asp Gln
 130 135 140
 Ala Arg Gln Glu Arg Leu Arg Arg Arg Arg Glu Thr Gln Val
 145 150 155
 <210> 21
 <211> 151
 <212> PRT
 <213> Human papillomavirus type 51
 <400> 21
 Met Phe Glu Asp Lys Arg Glu Arg Pro Arg Thr Leu His Glu Leu Cys
 1 5 10 15
 Glu Ala Leu Asn Val Ser Met His Asn Ile Gln Val Val Cys Val Tyr
 20 25 30
 Cys Lys Lys Glu Leu Cys Arg Ala Asp Val Tyr Asn Val Ala Phe Thr
 35 40 45
 Glu Ile Lys Ile Val Tyr Arg Asp Asn Asn Pro Tyr Ala Val Cys Lys
 50 55 60
 Gln Cys Leu Leu Phe Tyr Ser Lys Ile Arg Glu Tyr Arg Arg Tyr Ser
 65 70 75 80
 Arg Ser Val Tyr Gly Thr Thr Leu Glu Ala Ile Thr Lys Lys Ser Leu
 85 90 95
 Tyr Asp Leu Ser Ile Arg Cys His Arg Cys Gln Arg Pro Leu Gly Pro
 100 105 110
 Glu Glu Lys Gln Lys Leu Val Asp Glu Lys Lys Arg Phe His Glu Ile
 115 120 125
 Ala Gly Arg Trp Thr Gly Gln Cys Ala Asn Cys Trp Gln Arg Thr Arg
 130 135 140
 Gln Arg Asn Glu Thr Gln Val
 145 150
 <210> 22
 <211> 148
 <212> PRT
 <213> Human papillomavirus type 52

<400> 22

Met Phe Glu Asp Pro Ala Thr Arg Pro Arg Thr Leu His Glu Leu Cys
 1 5 10 15

Glu Val Leu Glu Glu Ser Val His Glu Ile Arg Leu Gln Cys Val Gln
 20 25 30

Cys Lys Lys Glu Leu Gln Arg Arg Glu Val Tyr Lys Phe Leu Phe Thr
 35 40 45

Asp Leu Arg Ile Val Tyr Arg Asp Asn Asn Pro Tyr Gly Val Cys Ile
 50 55 60

Met Cys Leu Arg Phe Leu Ser Lys Ile Ser Glu Tyr Arg His Tyr Gln
 65 70 75 80

Tyr Ser Leu Tyr Gly Lys Thr Leu Glu Glu Arg Val Lys Lys Pro Leu
 85 90 95

Ser Glu Ile Thr Ile Arg Cys Ile Ile Cys Gln Thr Pro Leu Cys Pro
 100 105 110

Glu Glu Lys Glu Arg His Val Asn Ala Asn Lys Arg Phe His Asn Ile
 115 120 125

Met Gly Arg Trp Thr Gly Arg Cys Ser Glu Cys Trp Arg Pro Arg Pro
 130 135 140

Val Thr Gln Val
 145

<210> 23

<211> 155

<212> PRT

<213> Human papillomavirus type 56

<400> 23

Met Glu Pro Gln Phe Asn Asn Pro Gln Glu Arg Pro Arg Ser Leu His
 1 5 10 15

His Leu Ser Glu Val Leu Glu Ile Pro Leu Ile Asp Leu Arg Leu Ser
 20 25 30

Cys Val Tyr Cys Lys Lys Glu Leu Thr Arg Ala Glu Val Tyr Asn Phe
 35 40 45

Ala Cys Thr Glu Leu Lys Leu Val Tyr Arg Asp Asp Phe Pro Tyr Ala
 50 55 60

Val Cys Arg Val Cys Leu Leu Phe Tyr Ser Lys Val Arg Lys Tyr Arg
65 70 75 80

Tyr Tyr Asp Tyr Ser Val Tyr Gly Ala Thr Leu Glu Ser Ile Thr Lys
85 90 95

Lys Gln Leu Cys Asp Leu Leu Ile Arg Cys Tyr Arg Cys Gln Ser Pro
100 105 110

Leu Thr Pro Glu Glu Lys Gln Leu His Cys Asp Arg Lys Arg Arg Phe
115 120 125

His Leu Ile Ala His Gly Trp Thr Gly Ser Cys Leu Gly Cys Trp Arg
130 135 140

Gln Thr Ser Arg Glu Pro Arg Glu Ser Thr Val
145 150 155

<210> 24
<211> 149
<212> PRT
<213> Human papillomavirus type 58

<400> 24

Met Phe Gln Asp Ala Glu Glu Lys Pro Arg Thr Leu His Asp Leu Cys
1 5 10 15

Gln Ala Leu Glu Thr Ser Val His Glu Ile Glu Leu Lys Cys Val Glu
20 25 30

Cys Lys Lys Thr Leu Gln Arg Ser Glu Val Tyr Asp Phe Val Phe Ala
35 40 45

Asp Leu Arg Ile Val Tyr Arg Asp Gly Asn Pro Phe Ala Val Cys Lys
50 55 60

Val Cys Leu Arg Leu Leu Ser Lys Ile Ser Glu Tyr Arg His Tyr Asn
65 70 75 80

Tyr Ser Leu Tyr Gly Asp Thr Leu Glu Gln Thr Leu Lys Lys Cys Leu
85 90 95

Asn Glu Ile Leu Ile Arg Cys Ile Ile Cys Gln Arg Pro Leu Cys Pro
100 105 110

Gln Glu Lys Lys Arg His Val Asp Leu Asn Lys Arg Phe His Asn Ile
115 120 125

Ser Gly Arg Trp Thr Gly Arg Cys Ala Val Cys Trp Arg Pro Arg Arg
130 135 140

Arg Gln Thr Gln Val
145

<210> 25
<211> 160
<212> PRT
<213> Human papillomavirus type 59

<400> 25

Met Ala Arg Phe Glu Asp Pro Thr Gln Arg Pro Tyr Lys Leu Pro Asp
1 5 10 15

Leu Ser Thr Thr Leu Asn Ile Pro Leu His Asp Ile Arg Ile Asn Cys
20 25 30

Val Phe Cys Lys Gly Glu Leu Gln Glu Arg Glu Val Phe Glu Phe Ala
35 40 45

Phe Asn Asp Leu Phe Ile Val Tyr Arg Asp Cys Thr Pro Tyr Ala Ala
50 55 60

Cys Leu Lys Cys Ile Ser Phe Tyr Ala Arg Val Arg Glu Leu Arg Tyr
65 70 75 80

Tyr Arg Asp Ser Val Tyr Gly Glu Thr Leu Glu Ala Glu Thr Lys Thr
85 90 95

Pro Leu His Glu Leu Leu Ile Arg Cys Tyr Arg Cys Leu Lys Pro Leu
100 105 110

Cys Pro Thr Asp Lys Leu Lys His Ile Thr Glu Lys Arg Arg Phe His
115 120 125

Asn Ile Ala Gly Ile Tyr Thr Gly Gln Cys Arg Gly Cys Arg Thr Arg
130 135 140

Ala Arg His Leu Arg Gln Gln Arg Gln Ala Arg Ser Glu Thr Leu Val
145 150 155 160

<210> 26
<211> 158
<212> PRT
<213> Human papillomavirus type 68

<400> 26

Met Ala Leu Phe His Asn Pro Glu Glu Arg Pro Tyr Lys Leu Pro Asp
1 5 10 15

Leu Cys Arg Thr Leu Asp Thr Thr Leu His Asp Val Thr Ile Asp Cys
20 25 30

Val Tyr Cys Arg Arg Gln Leu Gln Arg Thr Glu Val Tyr Glu Phe Ala
 35 40 45

Phe Ser Asp Leu Cys Val Val Tyr Arg Asp Gly Val Pro Phe Ala Ala
 50 55 60

Cys Gln Ser Cys Ile Lys Phe Tyr Ala Lys Ile Arg Glu Leu Arg Tyr
 65 70 75 80

Tyr Ser Glu Ser Val Tyr Ala Thr Thr Leu Glu Thr Ile Thr Asn Thr
 85 90 95

Lys Leu Tyr Asn Leu Leu Ile Arg Cys Met Ser Cys Leu Lys Pro Leu
 100 105 110

Cys Pro Ala Glu Lys Leu Arg His Leu Thr Thr Lys Arg Arg Leu His
 115 120 125

Lys Ile Ala Gly Asn Phe Thr Gly Gln Cys Arg His Cys Trp Thr Ser
 130 135 140

Lys Arg Glu Asp Arg Arg Arg Ile Arg Gln Glu Thr Gln Val
 145 150 155

<210> 27
 <211> 105
 <212> PRT
 <213> Human papillomavirus type 18

<400> 27

Met His Gly Pro Lys Ala Thr Leu Gln Asp Ile Val Leu His Leu Glu
 1 5 10 15

Pro Gln Asn Glu Ile Pro Val Asp Leu Leu Cys His Glu Gln Leu Ser
 20 25 30

Asp Ser Glu Glu Glu Asn Asp Glu Ile Asp Gly Val Asn His Gln His
 35 40 45

Leu Pro Ala Arg Arg Ala Glu Pro Gln Arg His Thr Met Leu Cys Met
 50 55 60

Cys Cys Lys Cys Glu Ala Arg Ile Lys Leu Val Val Glu Ser Ser Ala
 65 70 75 80

Asp Asp Leu Arg Ala Phe Gln Gln Leu Phe Leu Asn Thr Leu Ser Phe
 85 90 95

Val Cys Pro Trp Cys Ala Ser Gln Gln
 100 105

<210> 28
 <211> 98
 <212> PRT
 <213> Human papillomavirus type 31

<400> 28

Met Arg Gly Glu Thr Pro Thr Leu Gln Asp Tyr Val Leu Asp Leu Gln
 1 5 10 15

Pro Glu Ala Thr Asp Leu His Cys Tyr Glu Gln Leu Pro Asp Ser Ser
 20 25 30

Asp Glu Glu Asp Val Ile Asp Ser Pro Ala Gly Gln Ala Glu Pro Asp
 35 40 45

Thr Ser Asn Tyr Asn Ile Val Thr Phe Cys Cys Gln Cys Lys Ser Thr
 50 55 60

Leu Arg Leu Cys Val Gln Ser Thr Gln Val Asp Ile Arg Ile Leu Gln
 65 70 75 80

Glu Leu Leu Met Gly Ser Phe Gly Ile Val Cys Pro Asn Cys Ser Thr
 85 90 95

Arg Leu

<210> 29
 <211> 97
 <212> PRT
 <213> Human papillomavirus type 33

<400> 29

Met Arg Gly His Lys Pro Thr Leu Lys Glu Tyr Val Leu Asp Leu Tyr
 1 5 10 15

Pro Glu Pro Thr Asp Leu Tyr Cys Tyr Glu Gln Leu Ser Asp Ser Ser
 20 25 30

Asp Glu Asp Glu Gly Leu Asp Arg Pro Asp Gly Gln Ala Gln Pro Ala
 35 40 45

Thr Ala Asp Tyr Tyr Ile Val Thr Cys Cys His Thr Cys Asn Thr Thr
 50 55 60

Val Arg Leu Cys Val Asn Ser Thr Ala Ser Asp Leu Arg Thr Ile Gln
 65 70 75 80

Gln Leu Leu Met Gly Thr Val Asn Ile Val Cys Pro Thr Cys Ala Gln
 85 90 95

Gln

<210> 30
 <211> 99
 <212> PRT
 <213> Human papillomavirus type 35

<400> 30

Met His Gly Glu Ile Thr Thr Leu Gln Asp Tyr Val Leu Asp Leu Glu
 1 5 10 15

Pro Glu Ala Thr Asp Leu Tyr Cys Tyr Glu Gln Leu Cys Asp Ser Ser
 20 25 30

Glu Glu Glu Glu Asp Thr Ile Asp Gly Pro Ala Gly Gln Ala Lys Pro
 35 40 45

Asp Thr Ser Asn Tyr Asn Ile Val Thr Ser Cys Cys Lys Cys Glu Ala
 50 55 60

Thr Leu Arg Leu Cys Val Gln Ser Thr His Ile Asp Ile Arg Lys Leu
 65 70 75 80

Glu Asp Leu Leu Met Gly Thr Phe Gly Ile Val Cys Pro Gly Cys Ser
 85 90 95

Gln Arg Ala

<210> 31
 <211> 109
 <212> PRT
 <213> Human papillomavirus type 39

<400> 31

Met Arg Gly Pro Lys Pro Thr Leu Gln Glu Ile Val Leu Asp Leu Cys
 1 5 10 15

Pro Tyr Asn Glu Ile Gln Pro Val Asp Leu Val Cys His Glu Gln Leu
 20 25 30

Gly Glu Ser Glu Asp Glu Ile Asp Glu Pro Asp His Ala Val Asn His
 35 40 45

Gln His Gln Leu Leu Ala Arg Arg Asp Glu Pro Gln Arg His Thr Ile
 50 55 60

Gln Cys Ser Cys Cys Lys Cys Asn Asn Thr Leu Gln Leu Val Val Glu
 65 70 75 80

Leu Gly Phe Val Cys Pro Trp Cys Ala Thr Ala Asn Gln
100 105

<400> 32

Pro Gln Asn Glu Leu Asp Pro Val Asp Leu Leu Cys Tyr Glu Gln Leu
20 25 30

Ser Glu Ser Glu Glu Glu Asn Asp Glu Ala Asp Gly Val Ser His Ala
35 40 45

Gln Leu Pro Ala Arg Arg Ala Glu Pro Gln Arg His Lys Ile Leu Cys
50 55 60

Val Cys Cys Lys Cys Asp Gly Arg Ile Glu Leu Thr Val Glu Ser Ser
65 70 75 80

Ala Glu Asp Leu Arg Thr Leu Gln Gln Leu Phe Leu Ser Thr Leu Ser
85 90 95

Phe Val Cys Pro Trp Cys Ala Thr Asn Gln
100 105

```
<210> 33
<211> 101
<212> PRT
<213> Human papillomavirus type 51
```

<400> 33

Met Arg Gly Asn Val Pro Gln Leu Lys Asp Val Val Leu His Leu Thr
1 5 10 15

Pro Gln Thr Glu Ile Asp Leu Gln Cys Tyr Glu Gln Phe Asp Ser Ser
20 25 30

Glu Glu Glu Asp Glu Val Asp Asn Met Arg Asp Gln Leu Pro Glu Arg
35 40 45

Arg Ala Gly Gln Ala Thr Cys Tyr Arg Ile Glu Ala Pro Cys Cys Arg
50 55 60

Cys Ser Ser Val Val Gln Leu Ala Val Glu Ser Ser Gly Asp Thr Leu
65 70 75 80

Arg Val Val Gln Gln Met Leu Met Gly Glu Leu Ser Leu Val Cys Pro
85 90 95

Cys Cys Ala Asn Asn
100

<210> 34
<211> 99
<212> PRT
<213> Human papillomavirus type 52

<400> 34

Met Arg Gly Asp Lys Ala Thr Ile Lys Asp Tyr Ile Leu Asp Leu Gln
1 5 10 15

Pro Glu Thr Thr Asp Leu His Cys Tyr Glu Gln Leu Gly Asp Ser Ser
20 25 30

Asp Glu Glu Asp Thr Asp Gly Val Asp Arg Pro Asp Gly Gln Ala Glu
35 40 45

Gln Ala Thr Ser Asn Tyr Tyr Ile Val Thr Tyr Cys His Ser Cys Asp
50 55 60

Ser Thr Leu Arg Leu Cys Ile His Ser Thr Ala Thr Asp Leu Arg Thr
65 70 75 80

Leu Gln Gln Met Leu Leu Gly Thr Leu Gln Val Val Cys Pro Gly Cys
85 90 95

Ala Arg Leu

<210> 35
<211> 105
<212> PRT
<213> Human papillomavirus type 56

<400> 35

Met His Gly Lys Val Pro Thr Leu Gln Asp Val Val Leu Glu Leu Thr
1 5 10 15

Pro Gln Thr Glu Ile Asp Leu Gln Cys Asn Glu Gln Leu Asp Ser Ser
20 25 30

Glu Asp Glu Asp Glu Asp Glu Val Asp His Leu Gln Glu Arg Pro Gln
35 40 45

Gln Ala Arg Gln Ala Lys Gln His Thr Cys Tyr Leu Ile His Val Pro
 50 55 60

Cys Cys Glu Cys Lys Phe Val Val Gln Leu Asp Ile Gln Ser Thr Lys
 65 70 75 80

Glu Asp Leu Arg Val Val Gln Gln Leu Leu Met Gly Ala Leu Thr Val
 85 90 95

Thr Cys Pro Leu Cys Ala Ser Ser Asn
 100 105

<210> 36
 <211> 98
 <212> PRT
 <213> Human papillomavirus type 58

<400> 36

Met Arg Gly Asn Asn Pro Thr Leu Arg Glu Tyr Ile Leu Asp Leu His
 1 5 10 15

Pro Glu Pro Thr Asp Leu Phe Cys Tyr Glu Gln Leu Cys Asp Ser Ser
 20 25 30

Asp Glu Asp Glu Ile Gly Leu Asp Gly Pro Asp Gly Gln Ala Gln Pro
 35 40 45

Ala Thr Ala Asn Tyr Tyr Ile Val Thr Cys Cys Tyr Thr Cys Gly Thr
 50 55 60

Thr Val Arg Leu Cys Ile Asn Ser Thr Thr Thr Asp Val Arg Thr Leu
 65 70 75 80

Gln Gln Leu Leu Met Gly Thr Cys Thr Ile Val Cys Pro Ser Cys Ala
 85 90 95

Gln Gln

<210> 37
 <211> 107
 <212> PRT
 <213> Human papillomavirus type 59

<400> 37

Met His Gly Pro Lys Ala Thr Leu Cys Asp Ile Val Leu Asp Leu Glu
 1 5 10 15

Pro Gln Asn Tyr Glu Glu Val Asp Leu Val Cys Tyr Glu Gln Leu Pro
 20 25 30

Asp Ser Asp Ser Glu Asn Glu Lys Asp Glu Pro Asp Gly Val Asn His
 35 40 45

Pro Leu Leu Leu Ala Arg Arg Ala Glu Pro Gln Arg His Asn Ile Val
 50 55 60

Cys Val Cys Cys Lys Cys Asn Asn Gln Leu Gln Leu Val Val Glu Thr
 65 70 75 80

Ser Gln Asp Gly Leu Arg Ala Leu Gln Gln Leu Phe Met Asp Thr Leu
 85 90 95

Ser Phe Val Cys Pro Leu Cys Ala Ala Asn Gln
 100 105

<210> 38
 <211> 110
 <212> PRT
 <213> Human papillomavirus type 68

<400> 38

Met His Gly Pro Lys Pro Thr Val Gln Glu Ile Val Leu Glu Leu Cys
 1 5 10 15

Pro Tyr Asn Glu Ile Gln Pro Val Asp Leu Val Cys His Glu Gln Leu
 20 25 30

Gly Asp Ser Asp Asp Glu Ile Asp Glu Pro Asp His Ala Val Asn His
 35 40 45

His Gln His Leu Leu Leu Ala Arg Arg Asp Glu Gln Gln Arg His Arg
 50 55 60

Ile Gln Cys Leu Cys Cys Lys Cys Asn Lys Ala Leu Gln Leu Val Val
 65 70 75 80

Glu Ala Ser Arg Asp Asn Leu Arg Thr Leu Gln Gln Leu Phe Met Asp
 85 90 95

Ser Leu Asn Phe Val Cys Pro Trp Cys Ala Thr Glu Thr Gln
 100 105 110

<210> 39
 <211> 152
 <212> PRT
 <213> Human papillomavirus

<220>
 <221> MISC_FEATURE
 <222> (1)..(152)
 <223> where Xaa is any amino acid

<400> 40

Xaa Xaa Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa

35 40 45
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Tyr Xaa Ile Xaa Xaa Xaa Cys
50 55 60
Cys Xaa Cys Xaa Xaa Xaa Xaa Xaa Leu Xaa Val Glx Ser Xaa Xaa Xaa
65 70 75 80
Asp Leu Arg Xaa Leu Gln Gln Leu Leu Met Gly Thr Leu Xaa Xaa Val
85 90 95
Cys Pro Xaa Cys Ala Xaa Xaa Xaa
100

<210> 41
<211> 9
<212> PRT
<213> Human papillomavirus type 16

<400> 41

Arg Ala His Tyr Asn Ile Val Thr Phe
1 5

<210> 42
<211> 477
<212> DNA
<213> Human papillomavirus type 18

<400> 42
atggcgcgct ttgaggatcc aacacggcga ccctacaagc tacctgatct gtgcacggaa 60
ctgaacactt cactgcaaga catagaaata acctgtgtat attgcaagac agtattggaa 120
cttacagagg tatttgaatt tgcatttaaa gatttatttg tgggttatag agacagtata 180
ccccatgctg catgccataa atgtatagat ttttattcta gaattagaga attaagacat 240
tattcagact ctgtgtatgg agacacattg gaaaaactaa ctaacactgg gttatacaat 300
ttattaataa ggtgcctgcg gtgccagaaa ccgttgaatc cagcagaaaa acttagacac 360
cttaatgaaa aacgacgatt tcacaacata gctggggcact atagaggcca gtgccattcg 420
tgctgcaacc gagcacgaca ggaacgactc caacgacgca gagaaacaca agtataa 477

<210> 43
<211> 474
<212> DNA
<213> Human papillomavirus type 31

<400> 43
atgttcaaaa atcctgcaga aagacctcgg aaattgcatg aactaagctc ggcatgggaa 60
ataccctacg atgaactaag attgaattgt gtctactgca aaggtcagtt aacagaaaca 120
gagggtattag attttgcatt tacagattta acaatagtat atagggacga cacaccacac 180
ggagtgtgta caaaatgttt aagattttat tcaaaagtaa gtgaatttag atggtataga 240

tatagtgtgt atggaacaac attagaaaaa ttgacaaaca aaggtatatg tgatttgta 300
attaggtgta taactgtgtca aagaccgttg tgtccagaag aaaaacaaag acatttgat 360
aaaaagaaac gattccacaa cataggagga aggtggacag gacgttgcag agcatgttg 420
agaagacctc gtactgaaac ccaagtgtaa acatgcgtgg agaaacacct acgt 474

<210> 44
<211> 450
<212> DNA
<213> Human papillomavirus type 33

<400> 44
atgtttcaag acactgagga aaaaccacga acattgcatg atttgtgcca agcattggag 60
acaactatac acaacattga actacagtgc gtggaatgca aaaaacctt gcaacgatct 120
gaggtatatg attttgcatt tgcagattta acagttgtat atagagagg aaatccattt 180
ggaatatgta aactgtgttt gcggttctta tctaaaatta gtgaatatag acattataat 240
tattctgtat atggaaatac attagaacaa acagttaaaa aacctttaa tgaaatatta 300
attaggtgta ttatatgtca aagaccttg tgtcctcaag aaaaaaacg acatgtggat 360
ttaaacaac gatttcataa ttttcgggt cgttgggcag ggcgctgtgc ggcgtgttg 420
aggccccgac gtagagaaac tgcactgtga 450

<210> 45
<211> 450
<212> DNA
<213> Human papillomavirus type 35

<400> 45
atgtttcagg acccagctga acgaccttac aaactgcatg atttgtgcaa cgaggtagaa 60
gaaagcatcc atgaaatttg tttgaattgt gtatactgca aacaagaatt acagcggagt 120
gaggtatatg actttgcatg ctatgatttg tgtatagtat atagagaagg ccagccatat 180
ggagtatgca tgaaatgttt aaaattttat tcaaaaataa gtgaatatag atggtataga 240
tatagtgtgt atggagaaac gttagaaaa caatgcaaca aacagttatg tcatttatta 300
attaggtgta ttacatgtca aaaaccgtg tgtccagttg aaaagcaaag acatttagaa 360
gaaaaaaaac gattccataa catcggtgga cgggtggacag gtcggtgtat gtccgtgttg 420
aaaccaacac gtagagaaac cgaggtgtaa 450

<210> 46
<211> 477
<212> DNA
<213> Human papillomavirus type 39

<400> 46
atggcgcgat ttcacaatcc tgcagaacgg ccatacaaat tgccagacct gtgcacaacg 60
ctggacacca ccttgcagga cattacaata gcctgtgtct attgcagacg accactacag 120

caaaccgagg tatatgaatt tgcatttagt gatttatatg tagtatatag ggacggggaa 180
ccactagctg catgccaatc atgtataaaa ttttatgcta aaatacggga gctacgatat 240
tactcggact cgggtgatgc aactacatta gaaaatataa ctaatacaaa gttatataat 300
ttattaataa ggtgcatgtg ttgtctgaaa ccgctgtgtc cagcagaaaa attaagacac 360
ctaaatagca aacgaagatt tcataaaata gcaggaagct atacaggaca gtgtcgacgg 420
tgctggacca caaacggga ggaccgcaga ctaacacgaa gagaaaccca agtataa 477

<210> 47
<211> 477
<212> DNA
<213> Human papillomavirus type 45

<400> 47
atggcgcgct ttgacgatcc aaagcaacga ccctacaagc taccagattt gtgcacagaa 60
ttgaatacat cactacaaga cgtatctatt gcctgtgtat attgcaaagc aacattggaa 120
cgcacagagg tatatcaatt tgcttttaaa gatttatgta tagtgtatag agactgtata 180
gcatatgctg catgccataa atgtatagac ttttattcca gaattagaga attaagatat 240
tattcaaact ctgtatatgg agagacactg gaaaaataa ctaatacaga gttgtataat 300
ttgttaataa ggtgcctgcg gtgccagaaa ccattgaacc cagcagaaaa acgtagacac 360
cttaaggaca aacgaagatt tcacagcata gctggacagt accgagggca gtgtaataca 420
tgttgtgacc aggcacggca agaaagactt cgcagacgta gggaaacaca agtatag 477

<210> 48
<211> 456
<212> DNA
<213> Human papillomavirus type 51

<400> 48
atgttcgaag acaagaggga aagaccacga acgctgcatg aattatgtga agctttgaac 60
gtttctatgc acaatataca ggtagtgtgt gtgtattgta aaaaggaatt atgtagagca 120
gatgtatata atgtagcatt tactgaaatt aagattgtat atagggataa taatccatat 180
gcagtatgca aacaatgttt actgttttat tcaaaaatta gagagtatag acgttatagc 240
aggtctgtgt atggtactac attagaggca attactaaaa aaagcttata tgatttatcg 300
ataaggtgtc atagatgtca aagaccactt gggcctgaag aaaagcaaaa attggtggac 360
gaaaaaaaaa ggttccatga aatagcggga cgttggacgg ggcaatgcgc taattgctgg 420
caacgtacac gacaacgtaa cgaaacccaa gtgttaa 456

<210> 49
<211> 447
<212> DNA
<213> Human papillomavirus type 52

<400> 49
atgtttgagg atccagcaac acgaccccg accctgcacg aattgtgtga ggtgctggaa 60

gaatcgggtgc atgaaataag gctgcagtgt gtgcagtgc aaaaagagct acaacgaaga 120
 gaggtataca agtttctatt tacagattta cgaatagtat atagagacaa taatccatat 180
 ggcgtgtgta ttatgtgcct acgcttttta tctaagataa gtgaatatag gcattatcaa 240
 tattcactgt atgggaaaac attagaagag agggtaaaaa aaccattaag tgaaataact 300
 attagatgta taatttgtca aacgccatta tgtcctgaag aaaaagaaag acatgttaat 360
 gcaaacaagc gatttcataa tattatgggt cggtggacag ggcgctgttc agagtgttgg 420
 agaccccgac ctgtgaccca agtgtaa 447

<210> 50
 <211> 465
 <212> DNA
 <213> Human papillomavirus type 56

<400> 50
 atggagccac aattcaacaa tccacaggaa cgtccacgaa gcctgcacca cttgagtga 60
 gtattagaaa tacctttaat tgatcttaga ttatcatgtg tatattgcaa aaaagaacta 120
 acacgtgctg aggtatataa ttttgcatgc actgaattaa aattagtgtg tagggatgat 180
 tttccttatg cagtgtgcag agtatgttta ttgttttata gtaaagttag aaaatatagg 240
 tattatgact attcagtgtg tggagctaca ctagaagta taactaaaaa acagttatgt 300
 gatttattaa taagggtgcta cagatgtcaa agtccgttaa ctccggagga aaagcaattg 360
 cattgtgaca gaaaaagacg atttcatcta atagcacatg gttggaccgg gtcatgtttg 420
 ggggtgctgga gacaaacatc tagagaacct agagaatcta cagta 465

<210> 51
 <211> 450
 <212> DNA
 <213> Human papillomavirus type 58

<400> 51
 atgttccagg acgcagagga gaaaccacgg acattgcatg atttgtgtca ggcgttggag 60
 acatctgtgc atgaaatcga attgaaatgc gttgaatgca aaaagacttt gcagcgatct 120
 gaggtatatg actttgtatt tgcagattta agaatagtgt atagagatgg aaatccattt 180
 gcagtatgta aagtgtgctt acgattgcta tctaaaataa gtgagtatag acattataat 240
 tattcgctat atggagacac attagaacaa acactaaaaa agtggtttaaa tgaaatatta 300
 attagatgta ttatttgtca aagaccattg tgtccacaag aaaaaaaaag gcatgtggat 360
 ttaaacaaaa ggtttcataa tatttcgggt cggtggacag ggcgctgtgc agtggttgg 420
 agaccccgac gtagacaaac acaagtgtaa 450

<210> 52
 <211> 483
 <212> DNA
 <213> Human papillomavirus type 59

<400> 52
 atggcacgct ttgaggatcc tacacaacga ccatacaaac tgcctgattt gagcacaaca 60
 ttgaatattc ctctgcatga tattcgcatc aattgtgtgt tttgcaaagg ggaactgcaa 120
 gaaagagagg tatttgaatt tgcttttaat gacttattta tagtgatatag agactgtaca 180
 ccgtatgcag cgtgtctgaa atgcatttca ttttatgcaa gagtaagaga attaagatat 240
 tatagagatt ccgtgtatgg agaaacatta gaggctgaaa ccaagacacc gttacatgag 300
 ctgctgatac gctgttatag atgcctaaaa cctctatgtc caacagataa attaaagcat 360
 ataactgaaa aaagaagatt ccataatata gctggaatat atacaggaca gtgtcgtggg 420
 tgctcgaccc gagcaagaca cctaagacag caacgacaag cgcgtagtga aacactgggtg 480
 taa 483

<210> 53
 <211> 477
 <212> DNA
 <213> Human papillomavirus type 68

<400> 53
 atggcgctat ttcacaaccc tgaggaacgg ccatacaaat tgccagacct gtgcaggaca 60
 ttggacacta cattgcatga cggtacaata gactgtgtct attgcagaag gcaactacaa 120
 cggacagagg tatatgaatt tgcctttagt gacctatgtg tagtgatatag agacggggta 180
 ccatttgctg catgccaatc atgtattaaa ttttatgcta aaatacggga actacgatat 240
 tactcggaat cgggtgtatgc aactacatta gaaaccataa ctaatacaaa gttatataat 300
 ttattgataa ggtgcatgag ttgcctgaaa ccattgtgtc cagcagaaaa actaaggcac 360
 ctaacaacaa aacgaagatt acataaaata gcaggaaact ttacaggaca gtgtcggcac 420
 tgctggacca gtaagcgaga ggaccgcaga cgcatacgtc aagaaacaca agtttaa 477

<210> 54
 <211> 318
 <212> DNA
 <213> Human papillomavirus type 18

<400> 54
 atgcatggac ctaaggcaac attgcaagac attgtattgc atttagagcc ccaaaatgaa 60
 attccggttg accttctatg tcacgagcaa ttaagcgact cagaggaaga aaacgatgaa 120
 atagatggag ttaatcatca acatttacca gcccgacgag ccgaaccaca acgtcacaca 180
 atgtttgtgta tgtgttgtaa gtgtgaagcc agaattaagc tagtagtaga aagctcagca 240
 gacgaccttc gagcattcca gcagctgttt ctgaacaccc tgcctttgt gtgtccgtgg 300
 tgtgcatccc agcagtaa 318

<210> 55
 <211> 297
 <212> DNA

<213> Human papillomavirus type 31

<400> 55
 atgCGTggag aaacacctac gttgcaagac tatgtgtag atttgcaacc tgaggcaact 60
 gacctccact gttatgagca attacccgac agctcagatg aggaggatgt catagacagt 120
 ccagctggac aagcagaacc ggacacatcc aattacaata tcgttacctt ttgttgtag 180
 tgtaagtcta cacttcgttt gtgtgtacag agcacacaag tagatattcg catattgcaa 240
 gagctgttaa tgggctcatt tggaatcgtg tgccccaact gttctactag actgtaa 297

<210> 56

<211> 294

<212> DNA

<213> Human papillomavirus type 33

<400> 56
 atgagaggac acaagccaac gttaaaggaa tatgttttag atttatatcc tgaaccaact 60
 gacctatact gctatgagca attaagtac agctcagatg aggatgaagg cttggaccgg 120
 ccagatggac aagcacaacc agccacagct gattactaca ttgtaacctg ttgtcacact 180
 tgtaacacca cagttcgttt atgtgtcaac agtacagcaa gtgacctacg aaccatacag 240
 caactactta tgggcacagt gaatattgtg tgcctacct gtgcacaaca ataa 294

<210> 57

<211> 300

<212> DNA

<213> Human papillomavirus type 35

<400> 57
 atgcatggag aaataactac attgcaagac tatgttttag atttggaacc cgaggcaact 60
 gacctatact gttatgagca attgtgtgac agctcagagg aggaggaaga tactattgac 120
 ggtccagctg gacaagcaaa accagacacc tccaattata atattgtaac gtcctgttgt 180
 aaatgtgagg cgacactacg tctgtgtgta cagagcacac acattgacat acgtaaattg 240
 gaagatttat taatgggcac atttggaata gtgtgccccg gctgttcaca gagagcataa 300

<210> 58

<211> 330

<212> DNA

<213> Human papillomavirus type 39

<400> 58
 atgCGTggac caaagcccac cttgcaggaa attgtattag atttatgtcc ttacaatgaa 60
 atacagccgg ttgaccttgt atgtcacgag caattaggag agtcagagga tgaatatagat 120
 gaaccgcacc atgcagttaa tcaccaacat caactactag ccagacggga tgaaccacag 180
 cgtcacacaa tacagtgttc gtgttgtaag tgtaacaaca cactgcagct ggtagtagaa 240
 gcctcacggg atactctgcg acaactacag cagctgttta tggactcact aggatttgtg 300
 tgtccgtggt gtgcaactgc aaaccagtaa 330

<210> 59
<211> 321
<212> DNA
<213> Human papillomavirus type 45

<400> 59
atgcatggac cccgggaaac actgcaagaa attgtattgc atttggaacc tcagaatgaa 60
ttagatcctg ttgacctgtt gtgttacgag caattaagcg agtcagagga ggaaaacgat 120
gaagcagatg gagttagtca tgcacaacta ccagcccgac gagccgaacc acagcgtcac 180
aaaattttgt gtgtatgttg taagtgtgac ggcagaattg agcttacagt agagagctcg 240
gcagaggacc ttagaacact acagcagctg tttttgagca ccttgtcctt tgtgtgtccg 300
tgggtgtgcaa ctaaccaata a 321

<210> 60
<211> 306
<212> DNA
<213> Human papillomavirus type 51

<400> 60
atgcgtggta atgtaccaca attaaaagat gtagtattgc atttaacacc acagactgaa 60
attgacttgc aatgctacga gcaatttgac agctcagagg aggaggatga agtagataat 120
atgcgtgacc agctaccaga aagacgggct ggacaggcta cgtgttacag aattgaagct 180
ccgtgttgca ggtgttcaag ttagtagaaa ctggcagtgg aaagcagtgg agacaccctt 240
cgcgttgtag agcagatgtt aatgggagaa ctaagcctgg ttgcccgtg ttgtgcgaac 300
aactag 306

<210> 61
<211> 300
<212> DNA
<213> Human papillomavirus type 52

<400> 61
atgcgtggag acaaagcaac tataaaagat tatatattag atctgcaacc tgaaacaact 60
gacctacact gctatgagca attaggtgac agctcagatg aggaggatac agatggtgtg 120
gaccggccag atggacaagc agaacaagcc acaagcaatt actacattgt gacatattgt 180
cacagttgtg atagcacact acggctatgc attcatagca ctgcgacgga ccttcgtact 240
ctacagcaaa tgctgttggg cacattacaa gttgtgtgcc cgggctgtgc acggctataa 300

<210> 62
<211> 318
<212> DNA
<213> Human papillomavirus type 56

<400> 62
atgcatggta aagtaccaac gctgcaagac gttgtattag aactaacacc tcaaacagaa 60
attgacctac agtgcaatga gcaattggac agctcagagg atgaggatga ggatgaagta 120

gaccatttgc aggagcggcc acagcaagct agacaagcta aacaacatac gtgttaccta 180
atacacgtac cttgttgtga gtgtaagttt gtggcgcagt tggacattca gaggacaaa 240
gaggacctgc gtgttgtaca acagctgctt atgggtgcgt taacagtaac gtgcccactc 300
tgcgcatcaa gtaactaa 318

<210> 63
<211> 297
<212> DNA
<213> Human papillomavirus type 58

<400> 63
atgagaggaa acaaccaaac gctaagagaa tatatttttag atttacatcc tgaaccaact 60
gacctattct gctatgagca attatgtgac agctcagacg aggatgaaat aggcttggac 120
gggccagatg gacaagcaca accggccaca gctaattact acattgtaac ttgttgttac 180
acttgtggca ccacgggttcg tttgtgtatc aacagtacaa caaccgacgt acgaacccta 240
cagcagctgc ttatgggcac atgtaccatt gtgtgcccta gctgtgcaca gcaataa 297

<210> 64
<211> 324
<212> DNA
<213> Human papillomavirus type 59

<400> 64
atgcatggac caaaagcaac actttgtgac attgttttag atttgaacc acaaaattat 60
gaggaagttg accttgtgtg ctacgagcaa ttacctgact ccgactccga gaatgaaaaa 120
gatgaaccag atggagttaa tcattcctttg ctactagcta gacgagctga accacagcgt 180
cacaacattg tgtgtgtgtg ttgtaagtgt aataatcaac ttcagctagt agtagaaacc 240
tcgcaagacg gattgcgagc cttacagcag ctgtttatgg acacactatc ctttgtgtgt 300
cctttgtgtg cagcaaacca gtaa 324

<210> 65
<211> 333
<212> DNA
<213> Human papillomavirus type 68

<400> 65
atgcatggac caaagccac cgtgcaggaa attgtgttag agctatgtcc atacaatgaa 60
atacagccgg ttgaccttgt atgtcacgag caattaggag attcagacga tgaaatagat 120
gaacccgacc atgcagttaa tcaccaccaa catctactac tagccagacg ggacgaacaa 180
cagcgtcaca gaattcagtg tctgtgttgt aagtgtaca aggcactgca actagtagta 240
gaagcgtcgc gggacaacct gcggacacta caacagctgt ttatggactc actaaatatt 300
gtgtgtccgt ggtgtgcaac tgaaaccag taa 333